

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : TOSHIBA CORP

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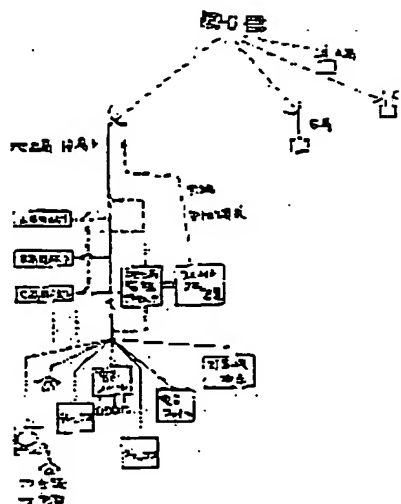
(72)Inventor : SERIZAWA MUTSUMI

## (54) SATELLITE COMMUNICATION SYSTEM

### (57)Abstract:

**PURPOSE:** To prevent excessive line congestion and delay in transmission through a CSC line by storing once an unurgent data of a small capacity and sending the data together when a DAMA line is opened by other matter.

**CONSTITUTION:** An earth station is provided with a memory for stations A, B, C...and accommodates many terminal equipments such as fax telephone and electronic mail. The information with small capacity and not requiring urgency among the information of the terminal equipments is stored in a memory once corresponding to a transmission opposite station. When any of terminal equipments accommodated in the earth station sends information with large capacity or urgency, a DAMA slave station equipment requests the line assignment and when the line is opened, the information with large capacity or urgency is sent and the content of the memory corresponding to an opposite station is sent at the same time.



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⑮ 発明の名称 衛星通信方式

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明 細 書

1. 発明の名称

衛星通信方式

2. 特許請求の範囲

(1) DAMA 方式によって設定された衛星回線を介して他の地上局と通信し、単数又は複数の端末を収容する地上局に、該地上局が通信する事のできる他の地上局個々に対応するメモリを備え、前記地上局の端末から相手地上局に送信すべく宛せられた非即時性小容量データを相手地上局に対応するメモリに一旦蓄積し、地上局と相手地上局との間に、前記非即時性小容量データ以外のデータを送信又は受信すべく回線が開かれた時、相手地上局に対応するメモリに蓄積されたデータを共に該回線を通じて送信することを特徴とする衛星通信方式。

(2) メモリに一定以上のデータが蓄積されたことをもって該メモリに対応する相手地上局との間で回線割当て要求を発することを特徴とする特許請求の範囲第1項記載の衛星通信方式。

(3) メモリにデータが蓄積された後、一定時間内に該メモリに対応する相手地上局との間で回線が開かれなかった場合、該相手地上局との間で回線割当て要求を発することを特徴とする特許請求の範囲第1項記載の衛星通信方式。

(4) DAMA 回線割当て装置は、回線利用者の低い時、該地上局に備えられたメモリに蓄積されたデータを、該メモリに対応する相手地上局に送信する指令を発し、送信する回線をも割当ててゐることを特徴とする特許請求の範囲第1項記載の衛星通信方式。

3. 発明の詳細な説明

(発明の目的)

(産業上の利用分野)

この発明は、DAMA 方式により回線交換を行なう衛星通信方式に関する。

(従来の技術)

近年、システムの柔軟性、何報性といった様々な理由から、衛星通信が多く用いられる様になって来た。この衛星通信システムにおいて、最近

DAMA方式が、回線利用効率の高さから、注目され、導入されるようになった。これらDAMA方式において、特に集中制御型DAMA方式が回線設定の安定性、確実性から多く用いられる。ところでこの集中制御型DAMA方式では、例えば第1の地上局(子局)が第2の地上局(子局)との間で通信を行なうとする場合、まず第1の地上局はCSC回線を通じ、親局に対して第1の局と第2の局の間に回線を割当てべく、回線割当て要求を発する。その回線割当て要求に従って親局は第1及び第2の地上局の間に回線を割当て、第1及び第2の地上局に該回線を用いて通信することを指示する。ここで第1及び第2の局は、割当てられた回線を用いて通信し通信終了後、回線断することを親局に告げ、親局の回線断確認を受けとった後、全ての通信手順を終了する。これを模式的に示したのが第3図である。この様に非常に高い回線利用効率をもって通信を行なえる。ところが、この方式において注目すべき点は衛星通信において生ずる伝送遅延である。即ち、衛星通信、

特に静止衛星通信において、信号が衛星を通じて相手局に到達するまでに0.25 secかかる。これはCSC回線においても同様で、従って回線を割当てられるために最低でも0.5 sec必要とする。又、回線終了にも0.5 sec必要であり、合計1 secが回線制御用に必要とされる。

ところで、衛星通信網を媒介として伝送される情報は即時性、大容量の音声、画像等の他に、電子メールや計算機間通信の様に小容量の情報も多い。ところで、この様な小容量情報をDAMA方式により伝送しようとした場合、通信に要する時間と比較し、通信に用いる回線を設定するのに必要な回線制御時間の方がはるかに大きい状態が生ずる。即ち、極めて小容量の情報の伝送のためにも回線割当て要求、回線割当て、回線断等、極めて複雑な手順を要し、その結果として特に多くの小容量データが有った場合、著しい回線利用効率の低下もしくはふくそう状態を生じ易い。

(発明が解決しようとする問題点)

このように、従来の技術においては、多くの

非即時性小容量データの伝送に当り、これら小容量データ発生毎に回線割当て要求を行うことによる回線利用効率の低下が大きく、さらにCSC回線を用いる場合に、CSC回線平均遅延時間が多くなっていた。

そこで、この発明は、このような従来の技術の問題点を修正し、回線利用効率の低下を防止し、CSC回線利用時の平均遅延時間の減少を可能とする衛星通信方式を提供することを目的とする。

(発明の構成)

(問題点を解決するための手段)

本発明は衛星回線を通じ伝送すべき小容量、非即時性データを相手地上局に対応したメモリに一旦蓄積するメモリと、小容量、非即時性以外のデータ伝送のために回線が開かれた時、該回線を用いて該回線相手側地上局に対応したメモリの内容を共に伝送する手段によって構成されている。

(作用)

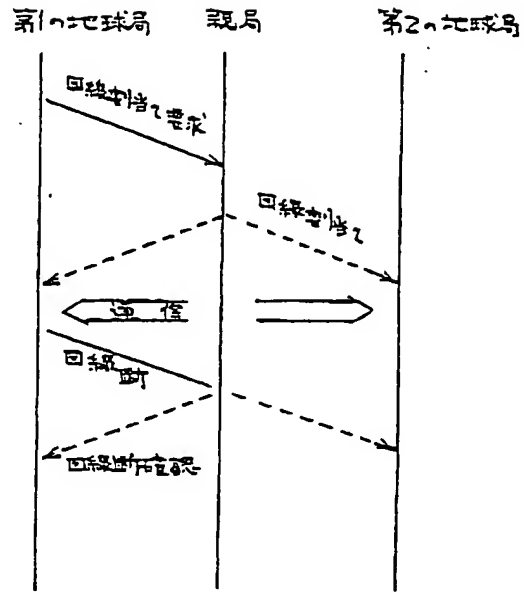
この発明では、DAMA方式による回線設定の方が、データ伝送より時間のかかる場合にも、十

客量で、かつ、非即時性のデータを一旦蓄積し、他の要件で、DAMA回線が開かれた時、共に伝送する。よって、過度の回線混雑、CSC回線の伝送遅延が低下する。

(実施例)

第1図に本発明の一実施例を示す。地上局はA、B、C…局用メモリを備え、又ファックス電話電子メール等多くの種別を収容している。これらの種別のうちいずれか、小容量、非即時性の情報は伝送相手局に対応するメモリに一旦記憶される。この地上局に収容する種別のうちのいずれかが、大容量、又は即時性情報を伝送する時、DAMA子局設置は、回線割当てを要求し、回線が開かれた時、大容量又は即時性情報を伝送すると共に、相手局に対応するメモリの内容(小容量、非即時性情報)をも同時に伝送する。この即時性通話の代表例として音声挙げられる。音声通話回線において、実際に音声情報が回線を占有している回線占有率はたかだか50-60%程度であり、この間にメモリ内の情報を共に送出、けることは容





第 3 図

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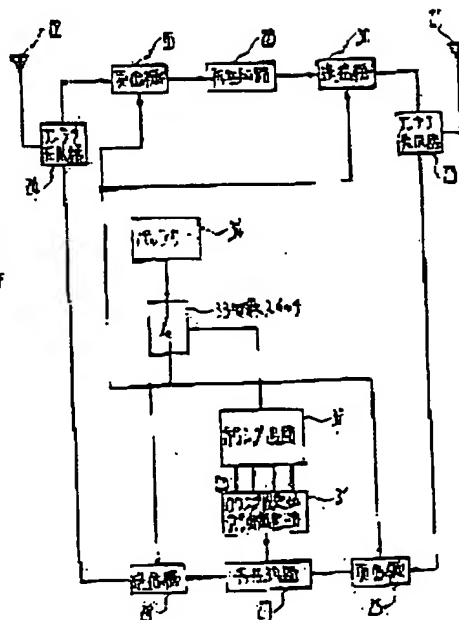
(72)Inventor : YATAGAI TETSUYA

## (54) BATTERY SAVING SYSTEM

## (57)Abstract

PURPOSE: To freely change the cycle of turning-on/off a power source corresponding to a time zone.

CONSTITUTION: A counter set value signal separating circuit 31 of a repeater station receives signals reproduced from a master station by a reproducing circuit 27 and separates a counter set value signal Cs multiplexed into the time slot of each frame. A counter circuit 32 is operated by a clock synchronized to the frame and receives the counter set value signal Cs, and this signal is loaded to the counter with the rise of the clock and counted-up with the rise of the clock. In this case, when a count value is not a prescribed value, a power supply switch 33 is turned off with the next clock, and power supply from a battery 34 is interrupted. When the count value is turned to the prescribed value, the power switch 33 is turned on.



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**CLAIMS**

[Claim(s)]

[Claim 1] The dc-battery saving method in the Time-Division-Multiplexing communication system which is characterized by providing the following and which a key station carries out on-off control of the power supply of a relay center and a child office intermittently, and reduces power consumption. The aforementioned key station is a means to generate the counter set point signal which specifies the period of power supply turning on and off. It is a means to have a means to carry out multiplex [ of the aforementioned counter set point signal ] into the time slot of each frame of a sending signal, and to transmit, and for the aforementioned relay center and a child office to receive the signal sent out by the aforementioned transmitting means, and to separate the aforementioned counter set point signal. A means to load to a counter the value which the counter set point signal separated by this separation means shows, and to start a count. The means which makes the aforementioned power supply an OFF state until the aforementioned counter becomes a predetermined value.

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the dc-battery saving method which a key station carries out on-off control of the electrical power system of a relay center and a child office intermittently, and reduces power consumption about a dc-battery saving method in the Time-Division-Multiplexing communication system which acts as intermediary.

[0002]

[Description of the Prior Art] Generally the key station is calling it dc-battery saving to carry out on-off control of the electrical power system of the relay center from which the signal of a key station is relayed, and the child office which communicates with a key station via a relay center, and to reduce the power consumption of a dc-battery.

[0003] Now, in Time-Division-Multiplexing communication system, each channel is using the same frequency and distinction of each channel is made by the time position (time slot) of a signal. For this reason, in order to connect a circuit correctly, all the relay centers and child offices need to detect the synchronizing signal for channel discernment sent out from a key station.

[0004] When performing dc-battery saving in such Time-Division-Multiplexing communication system conventionally, all relay centers and child offices are made to perform the on-off action of an electrical power system synchronously. For this reason, the key station has put in and sent out the synchronizing signal for dc-battery saving (henceforth BS synchronizing signal) in the time slot of each channel to send out. A relay center and a child office detect this BS synchronizing signal, and are performing dc-battery saving operation.

[0005] Drawing 5 is a timing chart which shows the conventional dc-battery saving operation, and shows the case where BS synchronizing signal which a key station sends out is transmitted to a child office through a relay center. In the relay center and the child office, if a power supply is turned off and a predetermined time  $T_s$  passes when BS synchronizing signal is detected, the power supply is set to ON. In this case, the predetermined time  $T_s$  is set up so that BS synchronizing signal sent out a fixed period from a key station can surely receive in a child office. Therefore, the effect of dc-battery saving is so large that the ratio of the power supply OFF time within a fixed period is large.

[0006] By the way, when a child office telephones to a key station, a call origination signal is sent out during the power supply ON of a child office, and a key station receives this call origination signal, stops sending out of BS synchronizing signal, and goes into a talk state.

[0007] Moreover, when a key station telephones to a child office, a key station sends out a call-in signal to the power supply "on" period of a child office, and a child office receives a call-in signal and sends out a reply signal to a key station. If a reply signal is received, a key station will stop sending out of BS synchronizing signal, and will go into a talk state.

[0008]

[Problem(s) to be Solved by the Invention] By the conventional dc-battery saving method mentioned above, when OFF time of a power supply is lengthened, possibility that the time which the call connection of a child office and a key station takes will become long, and two or more child offices will perform call origination operation simultaneously becomes high, and call origination operation becomes impossible. Therefore, OFF time of a power supply can seldom be lengthened. On the contrary, like a short paddle, possibility that the child office of plurality [ time / OFF / of a power supply ] will carry out call origination simultaneously becomes low, and more call origination processings and call-in processings can be performed.

[0009] By the way, occurrence of the call by two or more telephones is sharply changed by the time zone, and it is usually mostly [ daytime ] few night. On the other hand, dc-battery saving is needed in the remote relay center and remote child office which cannot but depend for a power supply on a dc-battery or a solar battery.

[0010] For this reason, by the conventional dc-battery saving method which is the same period and always performs dc-battery saving, there is a trouble of consuming power vainly, in the time zone of night with few calls. Since a solar battery does not operate night when the solar battery is being used especially as a power supply, it is necessary to reduce the power accumulated at the dc-battery.

[0011] The purpose of this invention is by enabling it to change freely the period of power supply turning on and off to lessen call loss as much as possible, and offer the dc-battery saving method which can reduce the power consumption of a relay center and a child office as much as possible.

[0012]

[Means for Solving the Problem] The dc-battery saving method of this invention is a dc-battery saving method in the Time-Division-Multiplexing communication system which a key station carries out on-off control of the power supply of a relay center and a child office intermittently, and reduces power consumption. A means by which the aforementioned key station generates the counter set point signal which specifies the period of power supply turning on and off, it has a means to carry out multiplex [ of the aforementioned counter set point signal ] into the time slot of each frame of a sending signal, and to transmit the aforementioned relay center and a child office A means to receive the signal sent out by the aforementioned transmitting means, and to separate the aforementioned counter set point signal. It has a means to load to a counter the value which the counter set point signal separated by this separation means shows, and to start a count, and the means which makes the aforementioned power supply an OFF state until the aforementioned counter becomes a predetermined value, and is



constituted.

[0013]

[Example] Next, this invention is explained with reference to a drawing.

[0014] Drawing 1 is the block diagram of a key station showing one example of this invention, and drawing 2 is the block diagram of a relay center showing one example of this invention. In addition, since the composition of a child office is the same as that of what removed the device for relay from the composition of the relay center shown in drawing 2, illustration is omitted.

[0015] Now, as shown in drawing 1, after a key station restores to the signal from a relay center with a receiver 3 through an antenna 1 and the antenna common machine 2 and decodes it by the decoder 4, it is sent out to the exchange 11 through the line concentration circuit 10. Moreover, the signal from the exchange 11 is encoded with an encoder 6 through the line concentration circuit 10, and it transmits to a relay center through a transmitter 5, the antenna common machine 2, and an antenna 1.

[0016] By the way, as the signal of one frame which a key station sends out is shown in drawing 3, the preamble and the synchronizing signal, and the counter set point signal for specifying the period of power supply turning on and off after that are included in the first time slot TS0 of one frame. This counter set point signal is expressed by 4 bits at this example.

[0017] In order to generate such a signal, the key station has formed the synchronizing signal generating circuit 7 which generates a synchronizing signal, the counter set point signal generation circuit 8 which generates the counter set point signal Cs, and the counter set point signal multiplex circuit 9 which carries out multiplex [ of a synchronizing signal and the counter set point signal Cs ].

[0018] Moreover, a relay center is transmitted through a transmitter 29, the antenna common machine 24, and an antenna 22, after getting down and reproducing the signal of a direction, i.e., the signal from a key station, by the regenerative circuit 27 through an antenna 21, the antenna common machine 23, and a receiver 25, as shown in drawing 2. Moreover, after reproducing by the regenerative circuit 28 through an antenna 22, the antenna common machine 24, and a receiver 26 similarly about the signal of the uphill direction, it transmits to a key station through a transmitter 30, the antenna common machine 23, and an antenna 21.

[0019] By the way, the counter set point signal separation circuit 31 separates the counter set point signal Cs in the corresponding time slot in response to the signal from the key station which the regenerative circuit 27 reproduced, and sends it out to a counter circuit 32 as a 4-bit signal. The counter circuit 32 is operating with the clock which synchronizes with a frame, is loaded to a counter in the start of a clock in response to the counter set point signal Cs, and is counted up in the start of a clock. Here, if the counted value of 4 bits was not (1, 1, 1, 1), when current supply from a dc-battery 34 to a transmitter and a receiver is made into \*\*, having used the electric power switch 33 as off with the following clock and counted value is set to (1, 1, 1, 1), an electric power switch 33 is set to ON.

[0020] Drawing 4 is a timing chart which shows dc-battery saving operation of this example. Since counted value is set to (1, 1, 1, 1) with one clock, as for the case, the 4-bit counter set point signal Cs becomes unable to carry out the period of dc-battery saving 2T (T is 1 clock time) (1, 1, 1, 0). Moreover, since counted value is set to (1, 1, 1, 1) with three clocks, the counter set point signal Cs becomes unable [ as for the case ] to carry out the period of dc-battery saving 4T (1, 1, 0, 0).

[0021] Now, in the initial state, the relay center and the child office supply the power supply to the transmitter and the receiver. At this time, the counted value of 4 bits of a counter circuit 32 is (1, 1, 1, 1). Usually, multiplex [ of the counter set point signal Cs ] was carried out to the main signal, it is sent out, and in a relay center and a child office, the counter set point signal Cs is received, the value is loaded to a counter, only the time according to the counter set point signal Cs turns off a power supply, and a key station performs dc-battery saving. A relay center and a child office continue dc-battery saving operation the same period until the counter set point signal Cs sent from a key station changes.

[0022] When a key station and a child office talk over the telephone, a key station makes an ON state the power supply of a relay center and a child office as (1, 1, 1, 1) for the counter set point signal Cs, performs call connection processing of call origination and a call in for every time slot by the line concentration circuit 10, changes it into an analog signal or a digital signal with a decoder 4 and an encoder 6, respectively, and connects a child office and the exchange 11.

[0023] Thus, since the period of dc-battery saving of a relay center and a child office can be changed by specifying the counter set point signal Cs by the key station side, dc-battery saving according to the time zone can be performed.

[0024] In addition, although this example explained the case where the counter set point signal Cs was expressed and counted up by 4 bits, even if it makes it count down even if it is not 4 bits and, it is clear that the same effect is acquired.

[0025]

[Effect of the Invention] As explained above, according to this invention, by the key station side in the time slot of each frame of a sending signal Multiplex [ of the counter set point signal for specifying the period of power supply turning on and off ] is carried out, and it transmits, in a relay center and a child office By receiving the counter set point signal which the key station transmitted, controlling power supply OFF time according to a counter set point signal, and changing the period of dc-battery saving Since the period of power supply OFF in a time zone (night) with few calls than a time zone with many calls (daytime) can be lengthened, compared with the former, the power-saving effect becomes large. Moreover, in a time zone with many calls, since the period of power supply ON can be made shorter than a time zone with few calls, call loss can be lessened.

[Translation done.]